

and second and third cavities **125b** and **125c** may also be allowed to start expansion at different times.

[0046] Similar to the second preferred embodiment, the fourth preferred embodiment preferably includes a processor that controls the displacement device **130** and the valve **139**. The processor preferably regulates the volume of fluid that is displaced by the displacement device **130** and/or the volume of fluid that enters and exits the cavities **125** to expand and retracts the cavities **125** to prevent over expansion and over retraction. The processor preferably also determines if one (and which one) or both of the second and third cavities **125b** and **125c** is to be expanded. In the variation of the fourth preferred embodiment where the displacement device **130** functions to expand a first group of cavities **125** and one of a second and third group of cavities **125**, if the number of cavities within the second group of cavities **125** is different from the number of cavities within the third group of cavities **125**, the processor preferably regulates the volume of fluid that is displaced by the displacement device **130** to accommodate for the difference in volume of fluid necessary to expand each group of cavities **125**. In all other respects, the processor of the fourth preferred embodiments is preferably similar or identical to the processor of the second preferred embodiment.

[0047] The user interface system may include a plurality of displacement devices **130** and/or a plurality of valves **139**. All of the cavities **125** of the plurality of cavities **125** are preferably arranged within one fluid network **200**, but may alternatively be arranged in more than one fluid network **200**. The displacement device **130** and/or valves **139** are preferably also arranged within one fluid network **200** and are preferably controlled by one processor, but may alternatively be arranged in more than one fluid network **200** and may be controlled by more than one processor. However, the plurality of cavities **125**, displacement device **130**, and valves **139** may be arranged in any other suitable arrangement.

[0048] While omitted for conciseness, the invention includes every possible permutation and combination of the various elements described above.

[0049] As a person skilled in the art will recognize from the previous detailed description and from the figures and claims, modifications and changes can be made to the preferred embodiments of the invention without departing from the scope of this invention defined in the following claims.

We claim:

1. A user interface system, comprising:
 - a sheet that defines a surface on one side and at least partially defines a first cavity and a second cavity on an opposite side;
 - a fluid network coupled to the first and second cavities;
 - a displacement device coupled to the fluid network that displaces fluid within the fluid network and expands both the first and second cavities concurrently, thereby deforming a first and a second particular region of the surface; and
 - a touch sensor coupled to the sheet and adapted to sense a user touch proximate the first and second particular regions of the surface.
2. The user interface of claim 1, wherein the fluid network includes a channel that couples the first and second cavities to the displacement device.
3. The user interface of claim 2, wherein the channel includes a first segment that couples the first cavity to the

displacement device and a second segment that couples the second cavity to the displacement device.

4. The user interface of claim 3, wherein the second segment of the channel further couples the second cavity to the first cavity.

5. The user interface of claim 1, wherein the first cavity and the second cavity are of different material characteristics.

6. The user interface of claim 1, wherein the first cavity and the second cavity are of different geometry.

7. The user interface of claim 1, further including a second displacement device coupled to the fluid network and adapted to cooperate with the displacement device to displace fluid within the fluid network and expand both the first and second cavities concurrently.

8. A user interface system, comprising:

- a sheet that defines a surface on one side and at least partially defines a first cavity and a second cavity on an opposite side;

- a fluid network coupled to the first and second cavities;

- a displacement device coupled to the fluid network that displaces fluid within the fluid network and selectively expands one of the first and second cavities, thereby deforming a first particular region of the surface; and

- a touch sensor coupled to the sheet and adapted to sense a user touch proximate the particular region of the surface.

9. The user interface of claim 8, further comprising a valve that directs the fluid displaced by the displacement device to at least one of the first and second cavities.

10. The user interface of claim 9, wherein the valve directs the fluid displaced by the displacement device in a mode selected from the group consisting of: directing fluid into one of the first and second cavities and directing fluid into both the first and second cavities.

11. The user interface of claim 9, wherein the valve is a bi-state valve with an OPEN state and a CLOSED state, wherein the OPEN state allows fluid to pass through the valve and the CLOSED state prevents fluid from passing through the valve.

12. The user interface of claim 8, wherein the displacement device displaces fluid in a mode selected from the group consisting of: displacing fluid into one of the first and second cavities and displacing fluid into both the first and second cavities.

13. A user interface system, comprising:

- a sheet that defines a surface on one side and at least partially defines a first group of cavities and a second group of cavities;

- a fluid network coupled to the first and second groups of cavities;

- a displacement device coupled to the fluid network that displaces fluid within the fluid network and selectively expands one of the first and second groups of cavities, thereby deforming a first group of particular regions of the surface; and

- a touch sensor coupled to the sheet that senses a user touch proximate to the particular regions of the surface.

14. The user interface of claim 13, wherein the fluid network includes a channel that includes a first branch that couples each of the cavities of the first group of cavities to the displacement device, and a second branch that couples each of the cavities of the second group of cavities to the displacement device, wherein the first branch of the channel is